

PROGRESS ON GEMCAD UPGRADE

Robert Strickland is working on an upgrade for his "GemCad" program which he plans to release in a few weeks. Robert Long and I have been working with the beta version of the program (a "beta" version is a pre-release copy which is used under real working conditions to see if there are any problems with the code). The new version will address the problem of scaling a design from one L/W ratio to another. This is much different from making a "Tangent Ratio" transform which keeps L/W constant, but changes depth (or height) and elevation angles.

For a long time GemCad has had a scaling routine that could stretch (or shrink) X, Y, or Z coordinates separately or all three coordinates simultaneously. However, if one did a "stretch" in the X-dimension alone several things happen:

1. L/W changes
2. ECED End relationships are upset
3. Meetpoints may no longer be meetpoints
4. Previous "Equal" central angles will not all be equal
5. Indices of some facets may not be integral.
6. Angles (especially in the stretched direction) will be changed.

To make the "stretched" design easier to implement adjustment of angles and/or indices are needed. This was formerly a cut and try process in which GemCad could verify each step, but did not anticipate for you. The upcoming GemCad 4.5 version will do this part of the process interactively and automatically. The computer assumes that you want integral indices and a close match to the relationship between facets that existed in the original design. The computer allows you to try different "Index Gears" and gives you a listing of preferred choices.

For example if a cut cornered rectangle is being stretched, the new design would still be a cut cornered rectangle with the same number of facets, but the L/W would be different and the corners may no longer be 45 degree. If a circle is being stretched the result would be an oval. If an equilateral triangle is stretched the result would be either an isosceles triangle (two equal angled corners) or a freeform (no corners angles the same) depending on which direction the design was stretched. The possibilities for new designs are endless.

The design on page 1 of this issue is the result of one of the trials using the "beta" test version of GemCad. The original design was 04.037 Ember which we published in "Introduction to Meetpoint Faceting". Ember is a unique design

which was only available in one length-to-width ratio, 1.201. Several times we had attempted, without success, to scale the design to greater L/W without sacrificing the equal central angle feature on the pavilion. Not much luck there, so we decided to try the new GemCad routine to see what would happen.

The new design has the facets in approximately the same positions, but the corner/end facets are no longer ECED or at 45 degrees and the pavilion central facets are not equal. Instead of corners indexed [12-36-60-84] as in Ember the new design has corners indexed [10-38-58-86]. The central pavilion angles (P8-P9-P10) have a spread of 3.2 degrees instead of 0.0 degrees as in Ember.

All in all we found the new GemCad modifications work pretty well and certainly converge on a solution faster than the cut and try technique previously used.

Another new feature of GemCad 4.5 is the capability of running an 800x600 screen resolution mode (Super VGA). Some computers, mostly those working with Microsoft Windows, have established Super VGA as their standard operating mode. In the new version GemCad can also operate in that mode in DOS. The advantage is increased resolution on the screen. The only disadvantage we have noticed is a somewhat slower *mouse* action. This might be adjustable with the mouse setup, but we have not tried that.

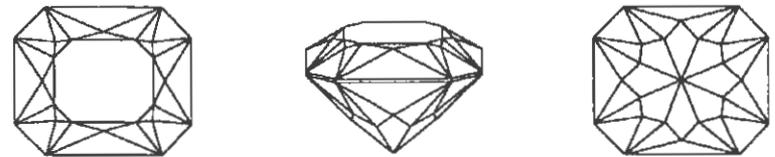


Fig. 1 Design 04.037 Ember (L/W=1.20)

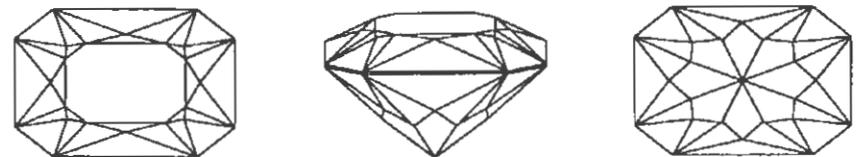


Fig. 2 Design 04.144 Ember Stretched (L/W=1.50)